Scudder exhibited specimens of muskrat skeletons, showing the number of the lumbar vertebrae to be six, and not three, as stated by Professor Flower. He also showed that the malar bone formed part of the continuity of the zygomatic arch; correcting the statement of Dr. Coues, in his 'Monograph of American Rodentia,' p. 253, with regard to the jugal of the muskrat, which is there described "as a mere splint, not forming by itself any part of the continuity of the arch, for the squamosal and maxillary spurs are absolutely in contact. This is a strong point of Fiber." Mr. Scudder remarked that muskrats were enabled to live from four to six minutes under water; owing, probably, to the enlargement of the abdominal *vena cava*, which extended over the abdominal aorta. He believed muskrats to be omnivorous, and said that the same individual could be taken repeatedly in the same trap.

May 17. — Dr. J. M. Flint gave a brief account of the history of medicine among the Chinese according to their own authors, and then discussed their theories in regard to the nature and causes of disease, and the action of remedies. Their ignorance of anatomy, and the consequent effects upon their theory and practice, were shown. The materia medica of the Chinese was then considered in detail, and its peculiarities, as well as its resemblances to our own present and past, as illustrated by the collection of Chinese drugs now in the possession of the National museum. —— Mr. Wiley Britton sent a paper on the buffalo gnat of Tennessee, in which he stated that its habitat was confined to the Mississippi valley, below the mouth of the Ohio River. The flies generally make their appearance about the first of April, and remain from two to four weeks. They destroy annually more or less live-stock, particularly mules and horses; which, however, could be protected by thorough greasing. The bite of this gnat is poisonous, causing a swelling somewhat like a bee-sting. —— Dr. T. H. Bean, in a paper on the white-fishes of North America, said there were twelve species indigenous to North America, besides the Inconnu, which is not properly a white-fish, though related to it. He made a few general remarks concerning the wide distribution, great abundance, and importance of the white-fishes as food, and stated the range of each species, its maximum size and weight, and its variations through age and conditions of habitat. A brief key to the species, intended to facilitate their speedy identification, and based upon natural characters only, was included in the paper. —— Dr. Thomas Taylor exhibited a new instrument, a micrometer, of his own invention, for measuring accurately and instantly to the $\frac{1}{20000}$ inch the thickness of any object. He also explained that pseudo-bacteria were produced by the heating of blood at a comparatively low temperature, and proposed to make experiments for the purpose of deciding whether a continuous fever of four or five days, with the blood at 104°, would produce the same results as blood artificially heated to 110°. If so, it would account for mistakes that have been made by persons inexperienced in examining the blood of fever patients, who report the presence of bacteria when it was simply pseudo-bacteria, or broken blood-corpuscles, as shown by Beal and others. He further explained a method of throwing upon a screen the circulation of blood in a frog's foot, the magnification depending upon the distance of the reflecting object, using the high powers of the microscope on the principle of double sight.

NOTES AND NEWS.

ALONG the eastern verge of the Bahamas, somewhere in that skirmish-line of islands consisting of Cat, Watling's, Samana, Mariguana, and Turk's, Columbus made his landfall. Each has had its advocates; and the late Gustavus V. Fox, in 1880, in a report of the coast-survey, maintained the claim of Samana, which at that time was the only one possible, that had failed of an advocate. His arguments are now reviewed, and the whole question examined afresh, by Lieut. Murdoch of the navy, in a paper just printed in the proceedings of the U. S. naval institute. He claims for Watling's, which has had some strong supporters since it was first named by Muñoz in 1793. It is believed to be the landfall by Capt. Becher of the royal navy, who has printed the most considerable monograph on the subject; and such leading students of our earliest history as Major among the English, and Peschel among the Germans, have also been its advocates. The question is never likely, however, to be set at rest, unless contemporary documentary evidence, not now known, comes to light. We have nothing but Columbus's own journal to guide us, and a part of that only in abstract as Las Casas made it. No theory can satisfy all the conditions which it prescribes; and those which can be satisfied do not seem to pertain exclusively to any one point, as the variety of views clearly shows. Watling's may be said to receive the support of the greatest number of authoritative critics; and nothing more conclusive can be held to have been attained.

— In an article in the June *Century*, entitled 'What is a liberal education?' (noticed in an earlier part of this number), President Eliot of Harvard thus speaks of the place of natural science in a liberal scheme of study: —

The last subject for which I claim admission to the magic circle of the liberal arts is natural science. All the subjects which the sixteenth century decided were liberal, and all the subjects which I have heretofore discussed, are studied in books; but natural science is to be studied, not in books, but in things. The student of languages, letters, philosophy, mathematics, history, or political economy, reads books, or listens to the words of his teacher. The student of natural science scrutinizes, touches, weighs, measures, analyzes, dissects, and watches things: by these exercises his powers of observation and judgment are trained, and he acquires the precious habit of observing the appearances, transformations, and processes of nature; like the hunter and the artist, he has open eyes and an educated judgment in seeing; he is at home in some large tract of nature's

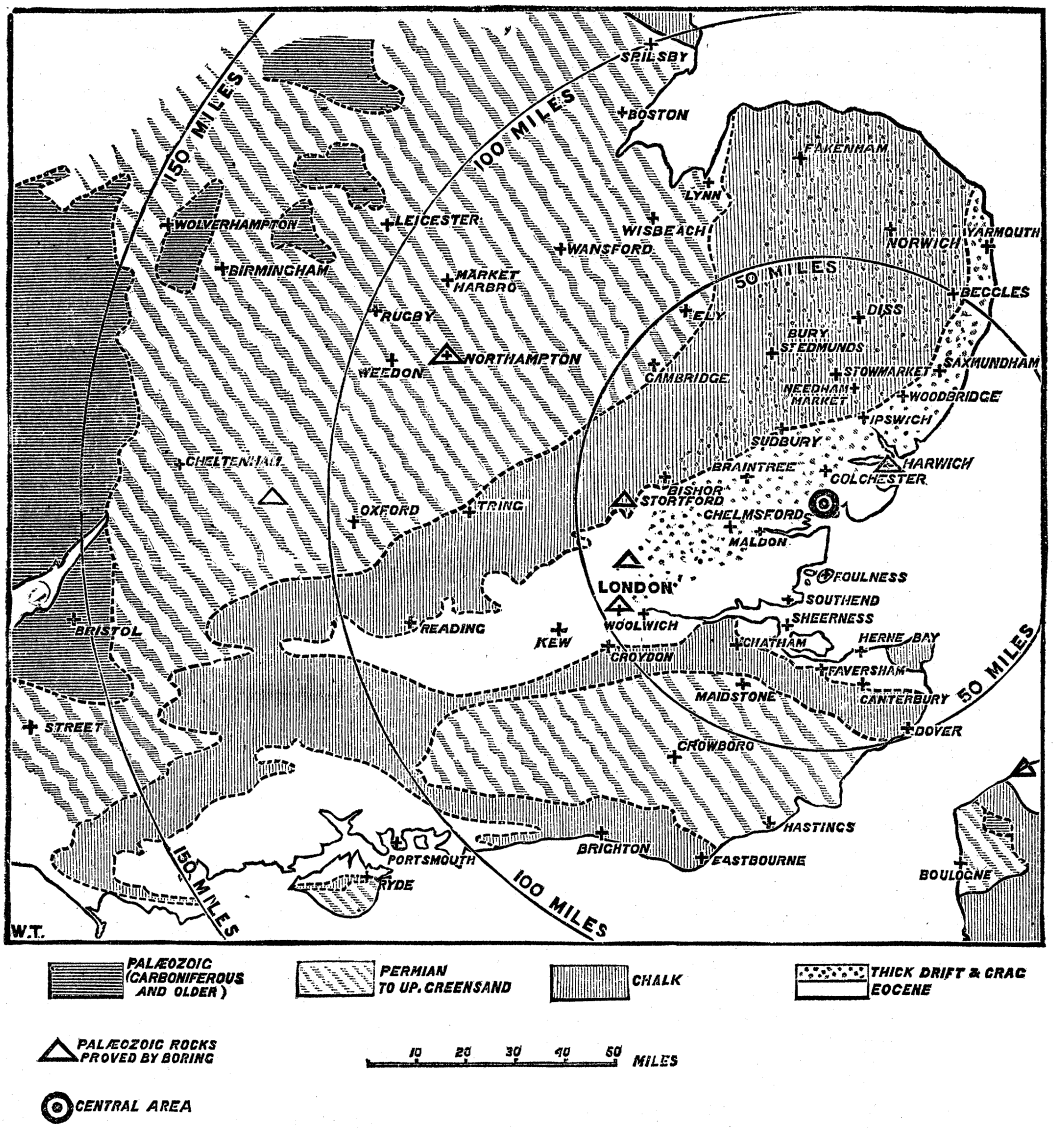
domain; finally, he acquires the scientific method of study in the field, where that method was originally perfected. In our day the spirit in which a true scholar will study Indian arrow-heads, cuneiform inscriptions, or reptile tracks in sandstone, is one and the same, although these objects belong respectively to three separate sciences, — archeology, philology, and paleontology. But what is this spirit? It is the patient, cautious, sincere, self-directing spirit of natural science. One of the best of living classical scholars, Professor Jebb of Glasgow, states this fact in the following forcible words: "The diffusion of that which is specially named science has at the same time spread abroad the only spirit in which any kind of knowledge can be prosecuted to a result of lasting intellectual value." Again: the arts built upon chemistry, physics, botany, zoölogy, and geology, are chief factors in the civilization of our time, and are growing in material and moral influence at a marvellous rate. Since the beginning of this century, they have wrought wonderful changes in the physical relation of man to the earth which he inhabits, in national demarcations, in industrial organization, in governmental functions, and in the modes of domestic life; and they will certainly do as much for the twentieth century as they have done for ours. They are not simply mechanical or material forces: they are also moral forces of great intensity. I maintain that the young science, which has already given to all sciences a new and better spirit and method, and to civilization new powers and resources of infinite range, deserves to be admitted with all possible honors to the circle of the liberal arts; and that a study fitted to train noble faculties, which are not trained by the studies now chiefly pursued in youth, ought to be admitted on terms of perfect equality to the academic curriculum.

The wise men of the fifteenth century took the best intellectual and moral materials existing in their day, — namely, the classical literatures, metaphysics, mathematics, and systematic theology, — and made of them the substance of the education which they called liberal. When we take the best intellectual and moral materials of their day and of ours to make up the list of subjects worthy to rank as liberal, and to be studied for discipline, ought we to omit that natural science which in its outcome supplies some of the most important forces of modern civilization? We do omit it. I do not know a single preparatory school in this country in which natural science has an adequate place, or any approach to an adequate place, although some beginnings have lately been made. There is very little profit in studying natural science in a book, as if it were grammar or history; for nothing of the peculiar discipline which the proper study of science supplies can be obtained in that way, although some information on scientific subjects may be so acquired. In most colleges a little scientific information is offered to the student through lectures on the use of manuals, but no scientific training. The science is rarely introduced as early as the sophomore year: generally it begins only with the junior year, by which time the mind of the student has become so set in the habits which the study of languages and mathematics engenders, that he finds great difficulty in grasping the scientific method. It seems to him absurd to perform experiments, or make dissections. Can he not read in a book, or see in a picture, what the results will be? The only way to prevent this disproportionate development of the young mind, on the side of linguistic and abstract reasoning, is to introduce into school courses of study a fair amount of training in sciences of observation. Over against four languages, the elements of mathematics, and the elements of history, there must be set some accurate study of things. Were other argument needed, I should find it in the great addition to the enjoyment of life which results from an early acquaintance and constant intimacy with the wonders and beauties of external nature. For boy and man this intimacy is a source of ever fresh delight.

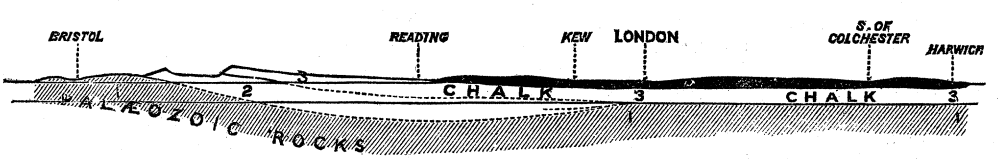
— Some questions having been raised in relation to the distance travelled by the Lapps of Baron Nordenskiöld's party in their excursion into central Greenland, Mr. Oscar Dickson arranged for a series of races on *skidor* ('snow-shoes') at Quickjock in Lapland. The distance which they claimed to have travelled over the Greenland ice was two hundred and thirty kilometres, going and returning in fifty-seven hours. For this reason the courses were arranged so as to have a total length of two hundred and twenty-seven kilometres. The races took place on the 3d of April last, and were spread over six days. The following results were obtained: —

The first prize, three hundred and fifty francs, was gained by Pavo Lars Tuorda, one of those who had visited Greenland with Nordenskiöld, and who travelled over the above-mentioned distance in twenty-one hours twenty-two minutes, including all stoppages. The second prize was gained by Pehr Olof Ländta, who came in half a minute later. The third and fourth prizes were awarded for the times of twenty-one hours thirty-three and a half minutes and twenty-one hours and fifty-six minutes respectively. Four others received a gratuity of thirty-five francs for having covered the distance in less than twenty-six hours. All arrived in good condition, unexhausted, and took part in the festivities which followed the races. Many of them had also travelled from seventy to a hundred kilometres before the race, to get to the point where the course began. It will be observed that the result completely confirms the claims of the Lapps on their journey in Greenland, as far as a parallel performance can do so.

— In an article in *Nature* of May 15, upon the recent earthquake in England, Mr. W. Topley gives a map of the affected district in which an attempt has been made to mark the positions of all places at which the shock was felt, so far as can be learned from published accounts; but in Essex, Suffolk, and North Kent, only a few of such places could be marked. By marking the outcrops of the older rocks (carboniferous and earlier), the possible connection of these with the travel of the earthquake-wave may be seen. This is made clearer by the section. The position of the



Map of the earthquake of April 22, 1884. N.B. — The places marked are those at which the shock was felt. In the east of England only the more important of such places are marked.



Section from Bristol to Harwich, showing the probable range of the paleozoic rocks. 1. Paleozoic rocks (carboniferous and older); 2. Permian to upper greensand; 3. Chalk.

paleozoic rocks is known at Harwich and London. There is some uncertainty as to their position under Reading and Colchester; but for the purpose intended, and regard being had to the depth at which the shock must have originated (certainly far within the paleozoic rocks), the line drawn is sufficiently near the truth. We can see how the shock can have been propagated through the hard paleozoic rocks, and

been felt where these are bare or thinly covered with newer rocks; whereas, through the thick and softer secondary and tertiary rocks, the wave might travel a shorter distance. Possibly, also, this section may suggest an explanation of the double shock which was sometimes recorded: the first would be that travelling quickly through the hard paleozoic rocks; the second, that propagated more slowly through the softer overlying newer rocks.

— The Niger expedition, sent out by Dr. Emil Riebeck of Halle, is to devote itself especially to linguistic and ethnographical exploration; and the first report of its work has just appeared, under the title "Ein beitrag zur kenntniss der fulischen sprache in Africa, von Gottlob Adolf Krause," — an octavo pamphlet of a hundred and eight pages, with a map of the region explored, published by Brockhaus, Leipzig. The name of the people whose language Mr. Krause has studied is variously spelled. They call themselves in the singular, Pul; in the plural, Ful (the change of the initial consonant is in accordance with a euphonic law of the language); the French usually write the name Poul, and this form has been adopted by some English writers; but the Arabs and other neighbors more commonly employ the other: and it therefore seems better to call the people Fuls, and their language the Fulic. This people, spread over a large part of western and middle Sudan, with a territory about one-fourth as large as Europe, has been long recognized as one of the most interesting on the continent of Africa. They are clearly distinguishable, in physical and mental characteristics, from the negroes south and west of them, and are perhaps allied in degree of culture, and in language, to the Cushite tribes who dwell in and near Abyssinia. There are found among them both the brown-red type and the black. They are not massed in one community, but are settled in groups, with various occupations, — some peaceful and industrious, others warlike and predatory. Whence and when they came to their present abode is not known: their traditions are either not clear, or are evidently affected by their contact with the Arabs and other Mohammedans. But, from the few historical accounts which have been collected by European travellers, we learn that the Fuls have been a conquering people for centuries. The first reliable mention of them occurs in the thirteenth century of our era, at which time they had already established a kingdom. At the present time two Ful kingdoms are in existence, — that of Sokoto, and that of Gando; and their conquering career still continues. They have long since embraced Islam, are zealous students of the Kuran, and have begun to create a national literature. One of the most interesting facts in the history of the North-African peoples is the readiness and intelligence with which they have accepted Islam; and there is no doubt that they have been greatly benefited by its literary and ethical culture. The Fulic language has no distinction of genders (according to Gen. Faidherbe, it distinguishes human beings from the lower animals in its noun-termination), and no declension of nouns; but, on the other hand, it has a very elaborate development of the verb. In this latter point, and in its pronominal forms, it seems to approach the Galla and other Cushic tongues, and even the Semitic. But these comparisons must be conducted very cautiously. The differences between the groups of languages in question are greater than their resemblances; and, if Semitic and Hamitic (that is, Egyptian, Libyan, and Cushic) ever formed one family, it was so long ago that the demonstration of their unity must be next to impossible. Mr. Krause compares some of the forms of these groups, and reaches the conclusion that the Fulic is to be regarded as proto-Hamitic; that is, as representing the original linguistic type from which Egyptian, Libyan (Berber), and Cushic have sprung: but this conclusion is not justified by the facts. Mr. Krause has done his work of exploration well; and it is to be hoped that he will be able to continue his investigations, and clear up some points in the Fulic language and history which are still obscure.

— *Nature*, May 29, states, that last autumn the expedition under Lieut. Holm for exploring the east coast of Greenland, and which is again to start northwards this spring, met a party of about sixty East-Greenlanders — men, women, and children — south of the island of Aluk, on the east coast. They were on the way to the west coast to sell bear, fox, and seal skins. Every attempt was made by the Danish explorer to induce some of them to return, and act as guides on his journey northwards; but the prospect of a visit to a Danish settlement proved too great. A considerable number of East-Greenlanders die on their way to the west coast. The East-Greenlanders are reported to differ much from the West-Greenlanders in stature and appearance; the men being often tall, with black beards and European cast of face. This seems to be particularly the case with those living far north. Both East and West Greenlanders have small hands and feet. During the year 1883, four boats with heathen East-Greenlanders arrived at Julianshaab. Three of these came from the distant Angmasalik; and in them there were also, for the first time, natives from Kelalualik, which is five days' journey farther north. The latter stated, that in the winter they were in the habit, when journeying on sleighs, of meeting with people living much farther north. Kelalualik being situated, it is believed, between latitude 67° and 68° north, it may be assumed that the whole line of coast from latitude 65° to 70° is to some degree populated.

— A note from Mr. Jurgens of the Lena international meteorological station says that the work there will terminate about the middle of June. The party will then proceed in boats to Yakutsk, where they hope to arrive in August. This letter, dated Nov. 13, says, that, during the summer of 1883, four hundred and fifty versts of routes in the Lena delta had been surveyed, and magnetic observations made at five different localities. The mean temperature of June, July, and August, was about 36° F. The Lena was closed by ice Sept. 19. During the summer the sky was constantly cloudy, with light winds accompanied by fog.

— The physical control of the character of sediments described by Rutot (see *Science*, 1883, ii. 560) is now considered by another Belgian geologist, Van den Broek, as the basis for a new style of classification of certain geological deposits; namely, for those fragmental strata, accumulated around the margin of oceanic areas, in which the alternation from coarse to fine sediments shows a variation in the depth of the water in which the accumulations were made. The work is an extension of the idea so well presented in Professor Newberry's 'Circles of deposition' some years ago.

— A meeting was held in Boston recently, at the rooms of the American academy of arts and sciences, to consider the advisability of forming a New-England society for observation and study of meteorology. Prof. W. H. Niles of the Massachusetts institute of technology was elected chairman, and Mr. W. M. Davis of Harvard college, secretary. After an informal discussion of the method and aims of such a society, a committee, consisting of Professor Winslow Upton of Brown university, Professor Arthur Searle of the Harvard college observatory, and Mr. Davis, was appointed to consider further plans for organization and work, and to report at a meeting to be called at an early date.

— *Cosmos les mondes* gives the following description of the Skrivanow pocket-battery. The element is constructed of sheet zinc and silver chloride wrapped in parchment paper, immersed in a solution of seventy-five parts of caustic potash, and a hundred of water. The whole is placed in a small trough of gutta-percha, which can be closed hermetically. The conductors and external contacts are of silver. Such an element, when complete, weighs about a hundred grams. Its electromotive force is 1.45 to 1.50 volt, and it yields for an hour a current of one ampère.

— Mr. Richard Jones, who has for many years devoted his attention to the preservation of meat, has now adopted a new process. The principle consists in the injection of a fluid preparation of boracic acid into the blood of the animal immediately after it has been stunned, and before its heart has ceased to beat; the whole operation, including the removal of the blood and chemical fluid from the body of the animal, only taking a few minutes. The quantity of boracic acid used is very small, and that little is almost immediately drawn out again with the blood. The preservation of the flesh is said to be thoroughly effected: the quantity of the chemical left in the flesh must therefore be very small, and can scarcely be injurious to the human system; for, as Professor Barff has proved by experiment, living animals, either of the human or other species, do not seem to be injured in any way by the consumption of it. A demonstration of the effects of the process was given in April at the Adelphi Hotel, when the joints cut from a sheep that had been hanging for more than seven weeks at the house of the Society of arts were cooked in various ways; and those present agreed that the meat was equal to ordinary butcher's meat.

— Mr. G. F. Kunz exhibited, at a recent meeting of the New-York academy of sciences, two ancient images of the llama and vicuna from the interior of Peru. They weighed six ounces each, and were both of solid silver, with the exception of the bodies, which were filled with some earthy material. The llama had evidently been acted upon by substances in the soil, which left the silver in a remarkably pure state; and the workmanship on this figure, especially the hair reproduction, was very fine. The vicuna is not of so pure silver, and is in a very good state of preservation. Mr. Kunz explained that a famine in the interior of the country had caused the graves to be despoiled of many thousand ounces of ornaments, which were carried to the seacoast, and there sold for their weight in silver and gold.

— It is said that a wild-flowers protection act has been introduced in the British house of commons, by the provisions of which any one, for twenty years to come, found grubbing up a fern, primrose, violet, or in fact any of the indigenous blossoms, shall be subject to fine and imprisonment. The inhabitants of Cornwall and Devonshire, those lands of fern, have been advertising largely their willingness to denude their own counties to supply the cities, — a process made easy by the parcel-post.

— The success of the late international exposition at Amsterdam has tempted the Colonial society of the Netherlands to propose the establishment of a periodical in French and Dutch, under the name of the *Revue coloniale et internationale*, in which those interested, of whatever nationality, can discuss with freedom any questions relating to colonial affairs. It is proposed to divide the contents into three sections, relating respectively to commerce and industry, government, and geography and ethnology. The support of geographers, in general, is requested toward the carrying-out of this programme.

— Some English tourists, including Mr. Graham of the Alpine club, have engaged two guides from the Bernese Oberland, and proceeded to India with the intention of scaling some of the high peaks of the Himalayas, especially Kabru (23,000 feet) and Zubanu (21,000 feet). For the present they will not attempt Mount Everest.

— We learn from *Nature*, May 29, that the French minister of education and the fine arts has proposed to place at the disposal of Pasteur, for the prosecution of his scientific experiments, a large domain situated at Villeneuve-Etang, which belongs to the state.

— Bove, after a short excursion on the Upper Parana, was to embark for the Falkland Islands and Tierra del Fuego. He expects to visit Italy this summer, and make preparations for an antarctic expedition projected for the year 1885.

— Widdeman, a French chemist, has observed that an insulating-skin can be produced on metal wires by decomposing plumbates and alkaline ferrates with the electric current. The method is as follows: prepare a bath of plumbate of potash by dissolving ten grams of litharge in a litre of water, to which two hundred grams of caustic soda has been

added, and boil it during half an hour. Let it rest, decant, and the bath is ready for use. The wire to be covered with the insulating-skin is connected to the positive pole of the battery, and a small strip of platinum to the negative pole. Both wire and platinum are then plunged in the bath. Metallic lead in a very divided state is precipitated at the negative pole, and peroxide of lead on the wire. This layer of peroxide takes all colors of the spectrum, and the insulation is highest when the wire takes a brownish-black tint. If this insulator is durable, it will prove of great service in electric lighting.

— The Society of naturalists of the St. Petersburg university have decided on affording means to three zoölogists for expeditions in 1884. One is to study the fauna of the White Sea; another, the embryology and development of the genus Accipenser in the Ural River. The botanical and geological excursions will be discussed later on.

— On May 19 Pasteur read, at the Academy of sciences, his report on his four years' experimental studies on hydrophobia, and the means, not of eradicating, but of weakening it. The correspondent of the London *Daily news* describes Pasteur as "a man of square-built figure, and having the rather coarse and solid air which one so often finds in aristocrats and peasants in the Franche Comté, his native province. The eyes are so accustomed to the microscope as to have lost in great measure their normal capacity of visional adaptation, and are devoid of expression." Pasteur admits, in his report on hydrophobia, that the microbe causing it has not been discovered, though he is sure of its existence; and that it may become again rebellious after it has been transmitted to an organism more favorable to its growth. Thus the virus inoculated from an ass to a rabbit will not kill the latter, but if passed on to another rabbit, and then to dog or man, will be fatal. He observed that in some animals the virus lost, and in others gained, force. In the rabbit its power was most visible, whereas the ape was less terribly affected. It therefore occurred to Pasteur, that, if virus were transmitted from one ape to another, it would grow weaker at each inoculation. He took some from a dog's brain, and inoculated an ape, which died from its rabid virus. He inoculated a second, and then a third, which was hardly indisposed. The virus so modified was transmitted to a rabbit, in whose body it recovered some strength. It increased in morbid power in a second and third rabbit, and attained the maximum in the fourth. It would thus be seen that virulence was only kept in check by withholding from it good conditions for growth. It would be also seen that it never recovered, when well tamed, its pristine deadliness in a single bound. Pasteur claimed to so completely tame the virus, that a dog would, in being rendered refractory to rabies by hypodermic inoculation or trepanning, show no sign of illness. In the second part of his report, Pasteur explained how the maximum of virulence was certainly attained, by making several guinea-pigs the mediums between rabbits and dogs. He told the academy he had discovered a process by which he can operate with diseased blood on healthy blood, and claims to be able to check the progress of rabies in freshly-bitten dogs or other animals. He asks the academy and the minister of public instruction to appoint a committee to study his proof experiments.

— One of the attractions of the London exhibition of hygiene is a street of old London, containing houses of various periods previous to the great fire of 1666, with the domestic arrangements of their time. Modern villa residences, as they ought to be, and as they ought not, also add to the interest of both tenant and landlord in what promises to be as great an attraction as the 'fisheries' was last year.

A correspondent of the New-York *Evening post* writes that the street representing old London was originally intended to be a life-like and life-sized model of Old Chepe, but it was found that no actual record of the locality remained. It was therefore decided to construct a street of celebrated and well-known relics, most of which have only disappeared within the last century. The work has been carried out under the superintendence of Mr. George Birch of the London and Middlesex archeological society. All the buildings belong to a period anterior to the great fire. One enters by Bishopsgate through a specimen of the old London wall: the arch is surmounted with the city arms, and a statue of Bishop William, the Norman. In the street we find the Rose inn, Fenchurch Street; the Cock tavern, Leadenhall; the Three squirrels, Fleet Street; Izaak Walton house, No. 120 Chancery Lane; and old shops from St. Ethelburga's Bishopsgate. The street is narrow, and the gables almost meet over one's head. A residence of the wealthy of that period is that of the Duc de Sully, also a house where Oliver Cromwell lodged in Westminster. There are examples of guild-halls, such as the Hall of the brotherhood, from Little Britain. Next we come upon the Old fountain hostelry from the Minories, — a quaint, tumble-down edifice of four stories, each projecting further over the other, and a lean-to gable roof. Whittington's palace is a fine specimen of the period. A full description of the show by the designers appears in the catalogue. There are specimens of all the Elizabethan types, as also of old Roman decoration in plaster and terra-cotta. The houses are peopled by figures dressed in the period from missals, old decorations, drawings, etc. Old armor, etc., has been lent, and the whole worked up into a most life-like show. The object is to give an idea of the hygienic condition under which our ancestors lived.

— The New-York *Evening post* states that the Spanish papers are full of the proposal to cut a canal from the Bay of Biscay to the Mediterranean Sea. The plan proposed is to deepen the River Gironde for some distance, and reach the open sea at Narbonne in the department of Aude. The proposed work will be about two hundred and fifty miles long, and will save a distance of nearly two thousand miles between Suez and London. Speaking of two great engineering proposals, one paper says that the channe tunnel will turn an island into a peninsula, while th new canal will turn a peninsula into an island.